

In The Claims

1-10. (Cancelled)

11. (Original) A process for producing a perfluoropolyether comprising (1) contacting a reactant with a metal halide to produce an alkoxide wherein said reactant is selected from the group consisting of a perfluoro acid halide, a C₂ to C₄-substituted ethyl epoxide, a C₃₊ fluoroketone, and combinations or two or more thereof; (2) contacting said alkoxide with hexafluoropropylene oxide or tetrafluorooxetane to produce a second acid halide; (3) esterifying said second acid halide to an ester; (4) reducing said ester to its corresponding alcohol; (5) converting said corresponding alcohol with a base to a salt; (6) contacting said salt with a C₃₊ olefin or perfluoroalkene to produce a fluoropolyether; and (7) fluorinating said fluoropolyether.

12. (Original) A process according to claim 11 wherein said C₃₊ olefin is a C₃-C₆ straight chain olefin, C₃-C₆ branched chain olefin, C₃-C₆ allyl halide, or combinations of two or more thereof.

13. (Original) A process according to claim 11 wherein said process comprises (1) contacting a perfluoro acid halide or a C₂ to C₄-substituted ethyl epoxide with a metal halide to produce an alkoxide; (2) contacting said alkoxide with hexafluoropropylene oxide or tetrafluorooxetane to produce a second acid halide; (3) esterifying said second acid halide to an ester; (4) reducing said ester to an alcohol; (5) contacting said alcohol with a base to produce a salt; (6) contacting said salt with a C₃ or higher olefin to produce a fluoropolyether; and (7) fluorinating said fluoropolyether.

14. (Original) A process according to claim 11 wherein said process comprises (1) contacting a perfluoro acid halide or a C₂ to C₄-substituted ethyl epoxide with a metal halide to produce an alkoxide; (2) contacting said alkoxide with hexafluoropropylene oxide or tetrafluorooxetane to produce a second acid halide; (3) esterifying said second acid halide to an ester; (4) reducing said ester to an alcohol; (5) contacting said alcohol with a base to produce a salt; (6) contacting said salt with a C₃₊ branched fluoroalkene or a C₃₊ allyl halide to produce a fluoropolyether; and (7) fluorinating said fluoropolyether.

15. (Original) A process according to claim 11 wherein said process comprises (1) contacting a perfluoro acid halide or a C₂ to C₄-substituted ethyl epoxide with a metal halide to produce an alkoxide; (2) contacting said alkoxide with hexafluoropropylene oxide or tetrafluorooxetane to produce a second acid halide; (3) esterifying said second acid halide to

an ester; (4) contacting said ester with a Grignard reagent to produce a carbinol; and (5) dehydrating or fluorinating said carbinol.

16. (Original) A process according to claim 11 wherein said process comprises (1) contacting a C₃ to C₆ fluoroketone with a metal halide to produce an alkoxide; (2) contacting said alkoxide with hexafluoropropylene oxide or tetrafluorooxetane to produce a second acid halide; (3) esterifying said second acid halide to an ester; (4) contacting said ester with a Grignard reagent to produce a carbinol; and (5) dehydrating or fluorinating said carbinol.

17. (Original) A process according to claim 11 wherein said process comprises (1) contacting a C₃ to C₆ fluoroketone with a metal halide to produce an alkoxide; (2) contacting said alkoxide with hexafluoropropylene oxide or tetrafluorooxetane to produce a second acid halide; (3) esterifying said second acid halide to an ester; (4) reducing said ester to an alcohol; (5) contacting said alcohol with a base to produce a salt; (6) contacting said salt with a C₃₊ olefin to produce a fluoropolyether; and (7) fluorinating said fluoropolyether.

18. (Original) A process according to claim 11 wherein said process comprises (1) contacting a C₃ to C₆ fluoroketone with a metal halide to produce an alkoxide; (2) contacting said alkoxide with hexafluoropropylene oxide or tetrafluorooxetane to produce a second acid halide; (3) esterifying said second acid halide to an ester; (4) reducing said ester to its corresponding alcohol; (5) converting said corresponding alcohol with a base to a salt; (6) contacting said salt with a C₃₊ fluoroalkene to produce a fluoropolyether; and (7) fluorinating said fluoropolyether.

19. (Original) A process according to claim 11 wherein said process comprises (1) contacting a perfluoro acid halide or a C₂ to C₄-substituted ethyl epoxide with a metal halide to produce an alkoxide; (2) contacting said alkoxide with hexafluoropropylene oxide or tetrafluorooxetane to produce a second acid halide; (3) contacting said second acid halide with a metal iodide to produce a second iodide; and (4) fluorinating said second iodide.

20. (Original) A process according to claim 11 wherein said process comprises (1) contacting a C₃ to C₆ fluoroketone with a metal halide to produce an alkoxide; (2) contacting said alkoxide with hexafluoropropylene oxide or tetrafluorooxetane to produce an acid halide; (3) contacting said acid halide with a metal iodide to produce a second iodide; and (4) fluorinating said second iodide.

21. (Original) A process according to claim 11 wherein said process comprises (1) contacting a perfluoro acid halide or a C₂ to C₄-substituted ethyl epoxide with a metal halide to produce an alkoxide; (2) contacting said alkoxide with hexafluoropropylene oxide or tetrafluorooxetane to produce a second acid halide; (3) contacting said second acid halide with a metal iodide to produce a second iodide; (4) contacting said second iodide with an olefin to produce a third iodide; and (5) fluorinating said third iodide.

22. (Original) A process according to claim 11 wherein said process comprises (1) contacting a C₃ to C₆ fluoroketone with a metal halide to produce an alkoxide; (2) contacting said alkoxide with hexafluoropropylene oxide or tetrafluorooxetane to produce an acid halide; (3) contacting said acid halide with a metal iodide to produce a second iodide; (4) contacting said second iodide with an olefin to produce a third iodide; and (5) fluorinating said third iodide.

23. (Original) A process according to claim 11 wherein said process comprises (1) contacting a perfluoro acid halide or a C₂ to C₄-substituted ethyl epoxide with a metal halide to produce an alkoxide; (2) contacting said alkoxide with hexafluoropropylene oxide or tetrafluorooxetane to produce a second acid halide; (3) contacting said second acid halide with a metal iodide to produce a second iodide; (4) contacting said second iodide with an olefin to produce a third iodide; (5) dehydrohalogenating said third iodide to give a second olefin; and (6) fluorinating said second olefin.

24. (Original) A process according to claim 11 wherein said process comprises (1) contacting a C₃ to C₆ fluoroketone with a metal halide to produce an alkoxide; (2) contacting said alkoxide with hexafluoropropylene oxide or tetrafluorooxetane to produce an acid halide; (3) contacting said acid halide with a metal iodide to produce a second iodide; (4) contacting said second iodide with an olefin to produce a third iodide; (5) dehydrohalogenating said third iodide to give a second olefin; and (6) fluorinating said second olefin.

25. (Original) A process according to claim 11 wherein said process comprises fluorinating a fluoropolyether having alkyl radical end groups; said radical has at least 3 carbon atoms per radical and is substantially free of methyl and ethyl; and a 1,2-bis(methyl)ethylene diradical, -CH(CH₃)CH(CH₃)-, is absent in the molecule of said fluoropolyether.

26. (Original) A process according to claim 25 wherein said process is carried out in the presence of a mixture comprising an inert solvent and a hydrogen fluoride scavenger.

27. (Original) A process according to claim 11 wherein said process comprises (1) contacting a perfluoro acid halide or a C₂ to C₄-substituted ethyl epoxide with a metal halide to produce an alkoxide; (2) contacting said alkoxide with hexafluoropropylene oxide or tetrafluorooxetane to produce a second acid halide; (3) contacting said second acid halide with a metal iodide to produce a second iodide; (4) replacing the iodine radicals of said second iodide with hydrogen radicals to produce a fluoropolyether containing hydrogen radicals; and (5) fluorinating said fluoropolyether.

28. (Original) A process according to claim 11 wherein said process comprises (1) contacting a C₃ to C₆ fluoroketone with a metal halide to produce an alkoxide; (2) contacting said alkoxide with hexafluoropropylene oxide or tetrafluorooxetane to produce an acid halide; (3) contacting said acid halide with a metal iodide to produce a second iodide; (4) replacing the iodine radicals of said second iodide with hydrogen radicals to produce a fluoropolyether containing hydrogen radicals; and (5) fluorinating said fluoropolyether.

29. (Original) A process according to claim 11 wherein said process comprises (1) contacting a perfluoro acid halide or a C₂ to C₄-substituted ethyl epoxide with a metal halide to produce an alkoxide; (2) contacting said alkoxide with hexafluoropropylene oxide or tetrafluorooxetane to produce a second acid halide; (3) contacting said second acid halide with a metal iodide to produce a second iodide; (4) contacting said second iodide with an olefin to produce a third iodide; (5) replacing the iodine radicals of said second iodide with hydrogen radicals to produce a fluoropolyether containing hydrogen radicals; and (6) fluorinating said fluoropolyether.

30. (Original) A process according to claim 11 wherein said process comprises (1) contacting a C₃ to C₆ fluoroketone with a metal halide to produce an alkoxide; (2) contacting said alkoxide with hexafluoropropylene oxide or tetrafluorooxetane to produce an acid halide; (3) contacting said acid halide with a metal iodide to produce a second iodide; (4) contacting said second iodide with an olefin to produce a third iodide; (5) replacing the iodine radicals of said second iodide with hydrogen radicals to produce a fluoropolyether containing hydrogen radicals; and (6) fluorinating said fluoropolyether.

31. (Original) A process according to claim 11 wherein said process comprises (1) contacting a perfluoro acid halide, a C₃ to C₆ fluoroketone, or a C₂ to C₄-substituted ethyl epoxide with a metal halide to produce an alkoxide; (2) contacting said alkoxide with hexafluoropropylene oxide or tetrafluorooxetane to produce a second acid halide; (3) esterifying said second acid halide to an ester; (4) reducing said ester to an alcohol;

(5) contacting said alcohol with sulfur tetrafluoride or derivative thereof to convert the OH groups of said alcohol to fluorine radicals thereby producing a fluoropolyether; and (6) fluorinating said fluoropolyether.

32. (Original) A process according to claim 11 wherein said process comprises (1) contacting a perfluoro acid halide, a C₃ to C₆ fluoroketone, or a C₂ to C₄-substituted ethyl epoxide with a metal halide to produce an alkoxide; (2) contacting said alkoxide with hexafluoropropylene oxide or tetrafluorooxetane to produce a second acid halide; (3) esterifying said second acid halide to an ester; (4) reducing said ester to an alcohol; (5) contacting said alcohol with a phosphorus pentahalide or derivative thereof to convert the OH groups of said alcohol to halide radicals thereby producing a fluoropolyether; and (6) fluorinating said fluoropolyether.

33. (Original) A process according to claim 11 wherein said process comprises (1) contacting a fluorotertiary alkoxy-containing compound with a first fluoropolyether to produce a second fluoropolyether and optionally (2) fluorinating said second fluoropolyether wherein said fluorotertiary alkoxy-containing compound is a salt of a fluorotertiary alcohol or a perfluoro-t-butyl hypofluorite; said first fluoropolyether has (i) a starting C₃-C₆ segment or R_f⁸(R_f⁹)CFO segment and (ii) a -A-O-C(CF₃)=CF₂ or a -A-O-C(CF₃)=CHF intermediate end group; R_f⁸ is C_jF_(2j+1); R_f⁹ is C_kF_(2k+1); j and k are each ≥ 1; (j + k) ≤ 5; and A is selected from the group consisting of O-(CF(CF₃)CF₂-O)_w, O-(CF₂-O)_x(CF₂CF₂-O)_y, O-(C₂F₄-O)_x, O-(C₂F₄-O)_x(C₃F₆-O)_y, O-(CF(CF₃)CF₂-O)_x(CF₂-O)_y, O(CF₂CF₂CF₂O)_w, O-(CF(CF₃)CF₂-O)_x(CF₂CF₂-O)_y-(CF₂-O)_z, and combinations of two or more thereof.

34. (Original) A process according to claim 33 wherein said fluorotertiary alkoxy-containing compound is a salt of a fluorotertiary alcohol.

35. (Original) A process according to claim 33 wherein said fluorotertiary alkoxy-containing compound is a perfluoro-t-butyl hypofluorite.